

OVERALL EXPECTATIONS

- analyze the relationships between changing societal needs, technological advances, and our understanding of internal systems of humans
- investigate, through laboratory inquiry or computer simulation, the functional responses of the respiratory and circulatory systems of animals, and the relationships between their respiratory, circulatory, and digestive systems
- demonstrate an understanding of animal anatomy and physiology, and describe disorders of the respiratory, circulatory, and digestive systems

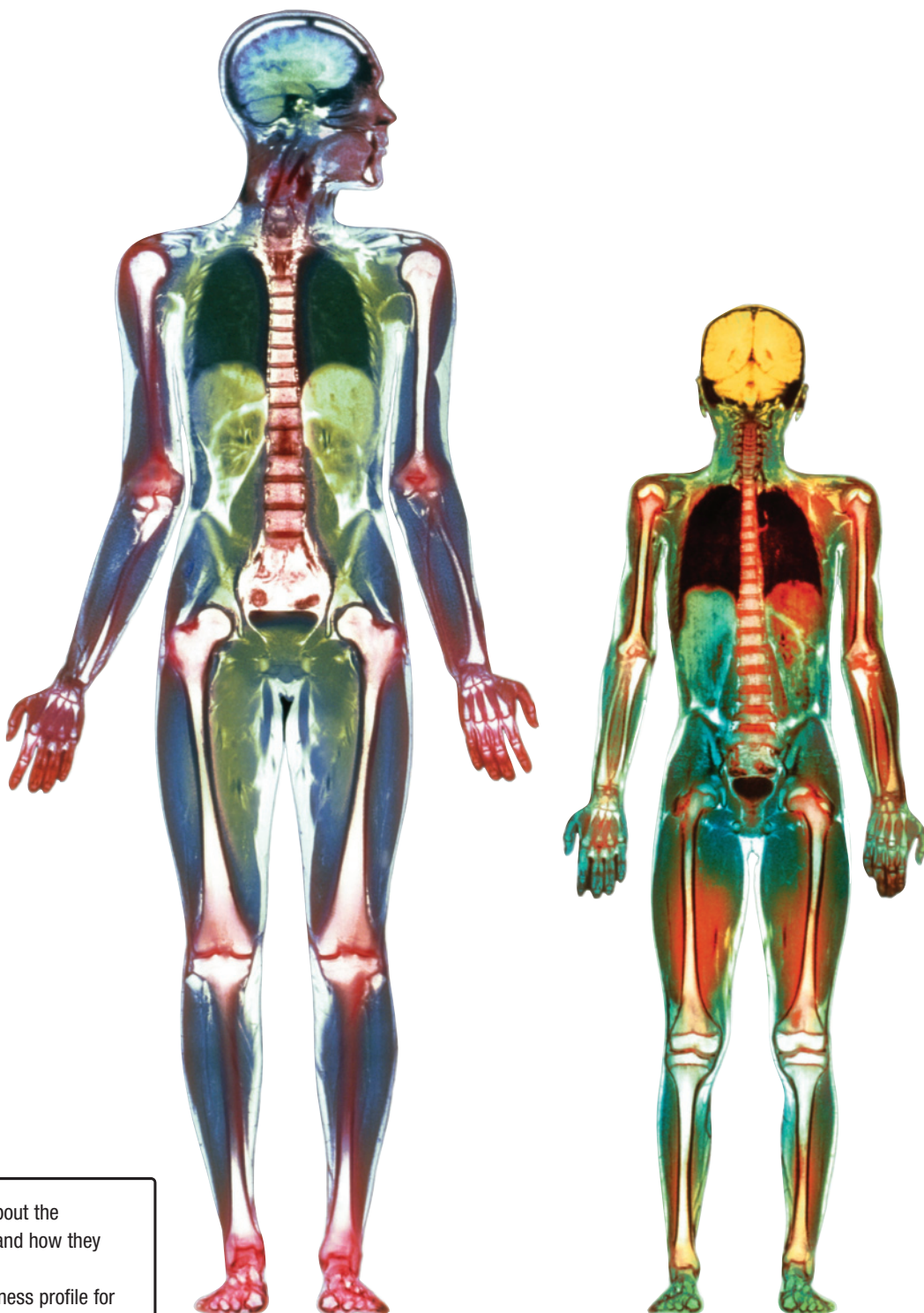
BIG IDEAS

- Groups of organs with specific structures and functions work together as systems, which interact with other systems in the body.
- The development and uses of technology to maintain human health are based, in part, on the changing needs of society.

UNIT TASK PREVIEW

As you progress through this unit, you will learn about the structure and function of selected organ systems and how they contribute to the health of an individual.

In the Unit Task you will create a health and fitness profile for an individual. You will then recommend an appropriate health and fitness plan for that individual. The Unit Task is described in detail on page 524. As you work through the unit look for Unit Task Bookmarks to see how information in the section relates to the Unit Task.



WHOLE BODY SCANS



The image on the facing page makes the human body look somewhat transparent. The image shows whole body scans of (from left) a man, a nine-year-old boy, and a woman. The technology used to create these scans provides a way of looking through the body; we can see inside without actually going inside. One of the most important advantages of this technology is that we can see if there are abnormalities in any of the organs, without invasive tests or procedures.

Doctors usually use this scanning technology as a secondary procedure after other tests have indicated a potential problem in some organ or body system. There is a trend in some countries for private clinics to market whole body scans to healthy individuals as a preventive health measure. This marketing is based on two ideas: if your scan looks normal, then you have peace of mind and do not need to worry about your health; if the scan reveals an unsuspected problem, then you have the advantage of an early diagnosis and a more effective treatment of the condition.

If this technology is available, should we be using it routinely to screen everyone and look for early signs of cancer, heart disease, and other abnormalities? The answer to this question may seem obvious. But questions with seemingly easy answers should usually be examined more closely. We need to ask many other questions before making a decision. For example,

- How effective is this technology for identifying potential health problems?
- Are there other screening and diagnostic procedures that are more effective?
- Does a normal scan guarantee that you are perfectly healthy? Are there diseases and conditions that cannot be revealed by a whole body scan?
- What risks are involved in a whole body scan?
- What does a whole body scan cost? Who pays these costs? Do the benefits justify the costs?

Questions

1. In a small group, discuss the possible advantages and disadvantages of using whole body scans to screen for potential health problems. Consider each of the questions listed above and speculate on possible answers.
2. After considering the questions listed above, can you easily say whether it is a good idea to routinely screen everyone using whole body scans? Explain your thinking.
3. Recommend a guideline for doctors regarding the use of whole body scans and present it to your classmates.

CONCEPTS

- identify and describe types of tissues
- understand the basic structure of organ systems
- understand the basic functions of organ systems
- describe interactions between organ systems
- explain the processes of diffusion and osmosis and their roles within a cell

SKILLS

- dissect a preserved specimen neatly and safely
- use scientific equipment accurately and safely
- research and collect information
- plan and conduct an experiment
- communicate scientific information clearly and accurately

Concepts Review

- In your notebook, match each tissue on the left with the correct description on the right. **K/U**

(a) epithelial	(i) bundles of long cells containing protein capable of contracting (shortening)
(b) muscle	(ii) various types of cells held together by a liquid, gel, or solid, known as a matrix
(c) connective	(iii) long thin cells with finely branching ends capable of conducting electrical impulses
(d) nerve	(iv) thin layers of tightly packed cells covering surfaces and lining internal cavities
- Describe the main function(s) of the tissues listed in Question 1. For each function, include an example of where it may take place within the body. **K/U A**
- Copy **Figure 1** into your notebook. Add labels to identify which substances undergo diffusion and which undergo osmosis. Include arrows to show the direction in which diffusion and osmosis occur. **K/U C**

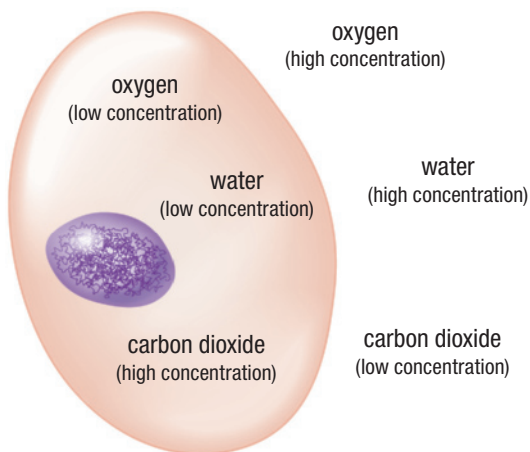


Figure 1

- Define the term “semi-permeable.” Why is it important for a cell membrane to be semi-permeable rather than completely permeable? **K/U A**
- Figure 2** shows a diagram of the human digestive system. In your notebook, match the following labels to the appropriate letter in Figure 2: liver, esophagus, large intestine, pancreas, stomach, small intestine. **K/U**

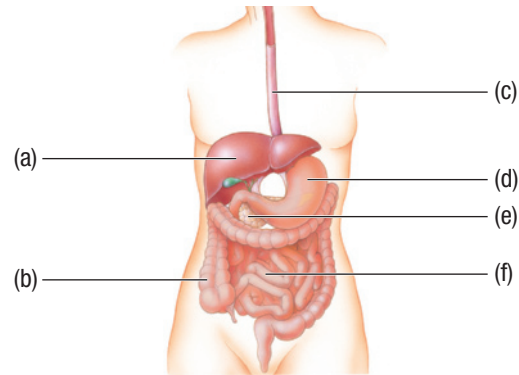


Figure 2 The human digestive system

- In your notebook, match each structure on the left with the corresponding body system on the right. **K/U**

(a) alveoli	(i) respiratory
(b) ventricles	
(c) capillaries	(ii) circulatory
(d) gall bladder	
(e) bronchi	(iii) digestive
(f) liver	
(g) platelets	
- Which of the following occurs during inhalation? **K/U**
 - diaphragm relaxes and air pressure in the lungs decreases
 - diaphragm relaxes and air pressure in the lungs increases
 - diaphragm contracts and air pressure in the lungs decreases
 - diaphragm contracts and air pressure in the lungs increases

8. Use a Venn diagram to compare and contrast the respiratory systems of fish and mammals. **K/U C**
9. Organ systems are interdependent—that is, they depend on one another and cannot function properly without other systems. **K/U A**
 - (a) Explain how the respiratory system and the digestive system are dependent on the circulatory system.
 - (b) Explain how the circulatory system is dependent on the respiratory system and the digestive system.
10. (a) Use a T-chart or other format to identify the possible benefits and risks of organ transplants.
 (b) What do you think is the main problem encountered by organ transplant programs? How might this problem be resolved? **K/U T/I C A**
11. A 50-year-old obese male has suffered a heart attack that was found to be a result of blocked arteries in his heart. Can you conclude that his obesity contributed to his condition? Explain your answer. **K/U T/I A**
13. Which of the following statements represents a testable hypothesis for this investigation? **T/I A**
 - (a) If the body produces more carbon dioxide during exercise, then exercise will increase the breathing rate.
 - (b) If the body produces more carbon dioxide during exercise, then breathing rate will increase as the duration of exercise increases because more carbon dioxide will be expelled.
 - (c) Exercise will increase the breathing rate because the heart beats faster during exercise.
 - (d) If the body produces more carbon dioxide during exercise, then exercise will increase the breathing rate, because increasing the breathing rate will increase the amount of oxygen available.

Skills Review

The graph in **Figure 3** shows the observations recorded during an investigation. Carefully study the graph and answer Questions 12 to 17.

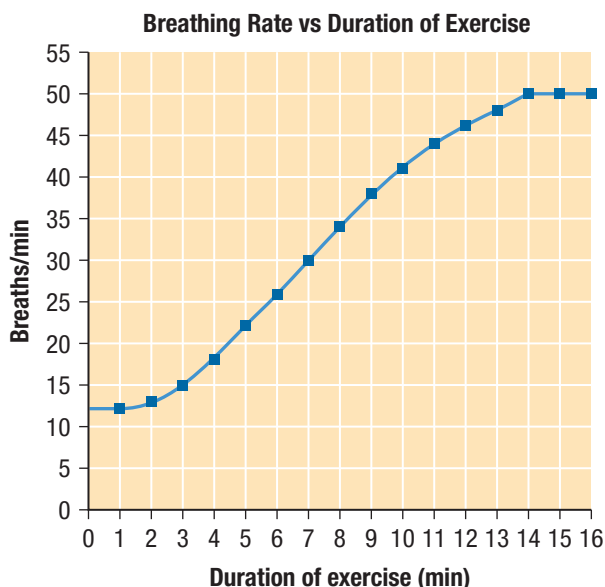


Figure 3

12. Which question do you think is the basis of the experiment? **T/I A**
 - (a) How is the respiratory system affected by exercise?
 - (b) How does the duration of exercise affect breathing rate?
 - (c) Does exercise affect breathing rate?
 - (d) How does the type of exercise affect breathing rate?
14. What is the independent variable in this experiment? **T/I A**
 - (a) duration of exercise
 - (b) breathing rate
 - (c) heart rate
 - (d) type of exercise
15. What is the dependent variable in this experiment? **T/I A**
 - (a) duration of exercise
 - (b) breathing rate
 - (c) heart rate
 - (d) type of exercise
16. What variable should be controlled in this experiment? **T/I A**
 - (a) duration of exercise
 - (b) breathing rate
 - (c) heart rate
 - (d) type of exercise
17. Which of the following statements is most appropriate as a valid conclusion based on the evidence? **T/I A**
 - (a) Strenuous exercise causes breathing rate to increase.
 - (b) Breathing rate increases as the duration of exercise increases.
 - (c) As the duration of exercise increases, breathing rate increases until it reaches a maximum rate.
 - (d) Breathing rate is not affected by the duration of exercise.



CAREER PATHWAYS PREVIEW

Throughout this unit you will see Career Links in the margins. These links mention careers that are relevant to the structure and function of animals. On the Chapter Summary page at the end of each chapter you will find a Career Pathways feature that shows you the educational requirements of the careers. There are also some career-related questions for you to research.